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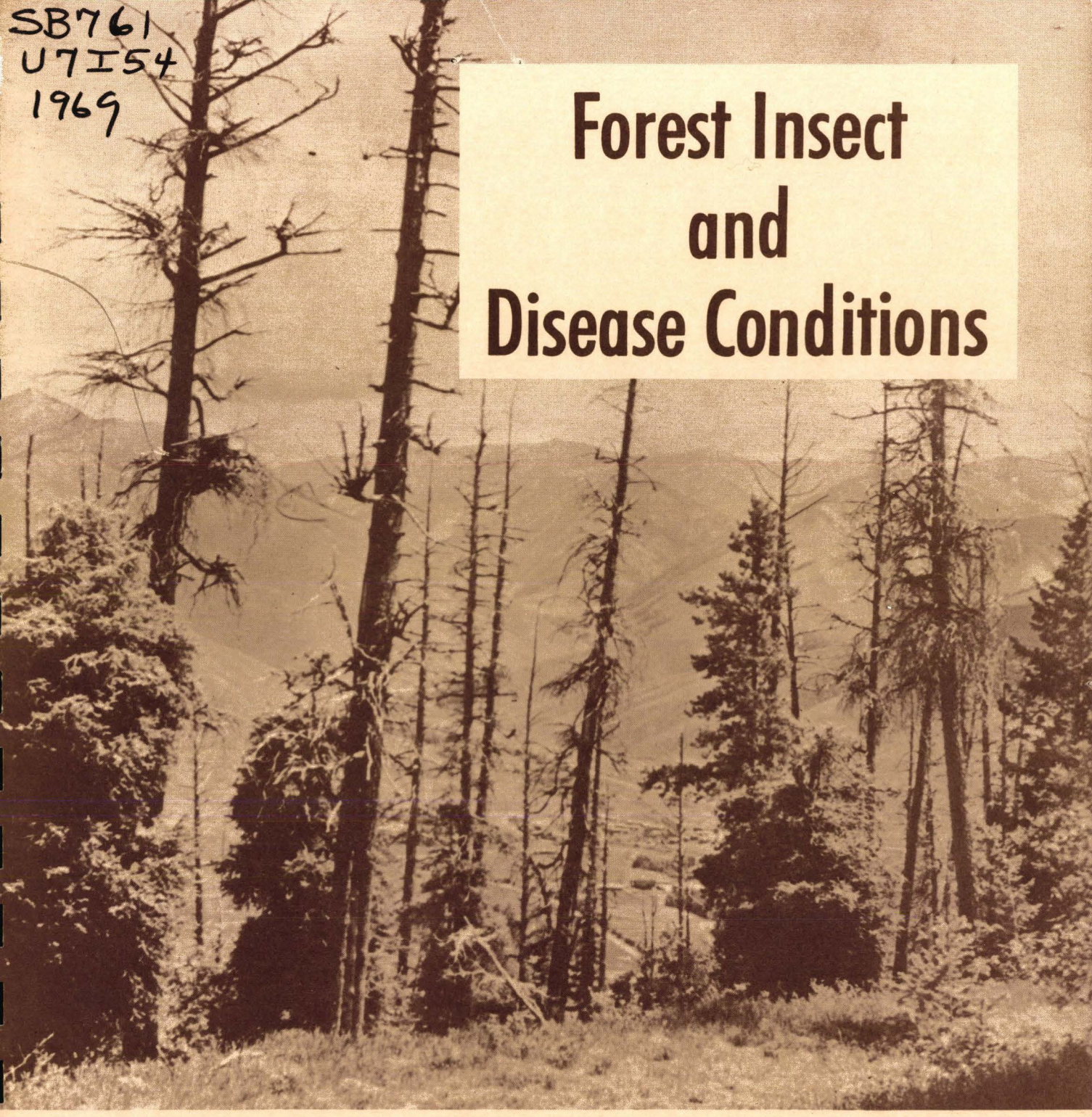

Forest Insect and Disease Conditions

in the Intermountain States during 1969

BRANCH OF FOREST INSECT AND DISEASE PREVENTION AND CONTROL
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COVER STORY

Heavy infection and mortality of Douglas-fir caused by the Douglas-fir dwarf mistletoe, *Arceuthobium douglasii*, on Mount Baldy, Sawtooth National Forest, near Ketchum, Idaho. Dwarf mistletoe is the most serious disease problem in the western United States. Yearly losses to this pathogen in Region Four are conservatively estimated to be almost 185 million board feet of timber. Dwarf mistletoe can be controlled by proper timber management and silvicultural techniques.

FOREST INSECT & DISEASE CONDITIONS IN THE INTERMOUNTAIN STATES DURING 1969

By

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March 1970

Branch of Forest Insect and Disease Prevention and Control

Division of Timber Management

Region Four Forest Service

U. S. Department of Agriculture

Ogden, Utah

TABLE OF CONTENTS

Subject	Page
Resumé of Insect Conditions	1
Bark Beetles	
Mountain pine beetle - lodgepole pine	1
Mountain pine beetle - ponderosa pine	3
Mountain pine beetle - Jeffrey pine	3
Douglas-fir beetle	4
Western pine beetle	4
Roundheaded pine beetle	4
Engelmann spruce beetle	4
Pine engravers	5
Control Considerations, Mountain Pine Beetle in Lodgepole Pine	5
Defoliators	
Western budworm	6
Sugar pine tortrix	7
Tent caterpillars	7
A blotch miner	8
A looper	8
A tussock moth	8
White fir needle miner	9
A white fir defoliator	9
Other Insects	
Lodgepole pine terminal weevil	9
Grass plant bug	9
Other forest and range pests	9
Forest Diseases	
Dwarf mistletoe	9
Root rots	10
Fomes annosus	10
Verticicladiella wagenerii	10
White pine blister rust	10
Other problems	10
Air pollution	10
Problems in recreation areas	11
Illustrations	
Stereograph of mountain pine beetle buildup in lodgepole pine	2
Ponderosa pine killed by mountain pine beetle	3
Top kill of lodgepole pine by sugar pine tortrix	7
Map	
Distribution of Major Forest Insects	Appendix

RESUMÉ OF INSECT CONDITIONS

Bark beetles continue to be the number one problem in the Intermountain Region. Of these tree killers, the mountain pine beetle in lodgepole pine heads the list. Control efforts have slowed the beetles' attacks in the continued control area on the Targhee National Forest, but in other areas of the Forest and in adjacent Yellowstone National Park, serious tree killing persists. A resurgence of beetle activity is occurring in most of Grand Teton National Park, while in adjoining Teton National Forest, beetle populations and subsequent tree killing continue to decline. Lodgepole mortality continues at a high level with no letup expected in both divisions of the Bridger National Forest. Small, rather localized, buildups are in progress throughout southern Idaho and northern Utah including a possible epidemic in one area of the Wasatch National Forest. Elsewhere, beetle populations are static or on the decrease. Killing of ponderosa pine was erratic with most of the mortality occurring in two of Utah's major recreation areas.

The Douglas-fir beetle continues to increase and deplete old growth Douglas-fir throughout southern Idaho. An outbreak of alarming proportions is underway in the Boise National Forest with less destructive but serious infestations occurring on the Payette, Sawtooth, Salmon, and Challis National Forests. Due to the scope of the infestation, control is not possible. Logging is recommended, but its only immediate benefit is salvage. A field trial will be conducted in the spring to determine the attractiveness of trees baited with host terpenes and a synthetic pheromone, frontalin.

Spruce beetle populations in high elevation spruce stands decreased in 1969. Salvage logging will help utilize dead and dying spruce in the Hilgard Mountain infestation on the Fishlake National Forest. Storm and avalanche damaged spruce may result in localized buildups in other areas of the Region. Losses by other bark beetles were widely separated. Western pine beetle activity was usually associated with the mountain pine beetle or ips, but it was the primary tree killer in one area on the Payette Forest. Once aggressive ips populations were reduced by natural factors except in one area on the Boise Forest. The roundheaded pine beetle continues to kill ponderosa pine in high-use recreation areas on the Toiyabe National Forest near Las Vegas, Neveda.

The heavy western budworm [1] populations and subsequent damage forecast for many Douglas-fir-true fir stands in southern Idaho and western Wyoming did not materialize. Only light to moderate defoliation is predicted for these same areas in 1970. Budworm populations on white fir were found for the first time in Bryce Canyon National Park.

A few new insect problems emerged and other existing ones of reduced extent caused concern in local situations in the Intermountain area. Most, however, did not require control.

BARK BEETLES

Mountain pine beetle, *Dendroctonus ponderosae* Hopk.

Lodgepole pine

The past ten years might easly be called the "decade of the mountain pine beetle" in the Intermountain West. During this period, this single insect species has killed an incalculable number of lodgepole pine and ponderosa pine throughout southern Idaho, western Wyoming, and northern Utah. Although certain infestations started during the mid and late fifties, most of the current infestations developed in the early sixties, reached a peak in 1965 and 1966, and have been on the decline since then. In some areas in Grand Teton Park and on the Teton and Targhee Forests, control has slowed annual attrition but extended the life of the infestations.

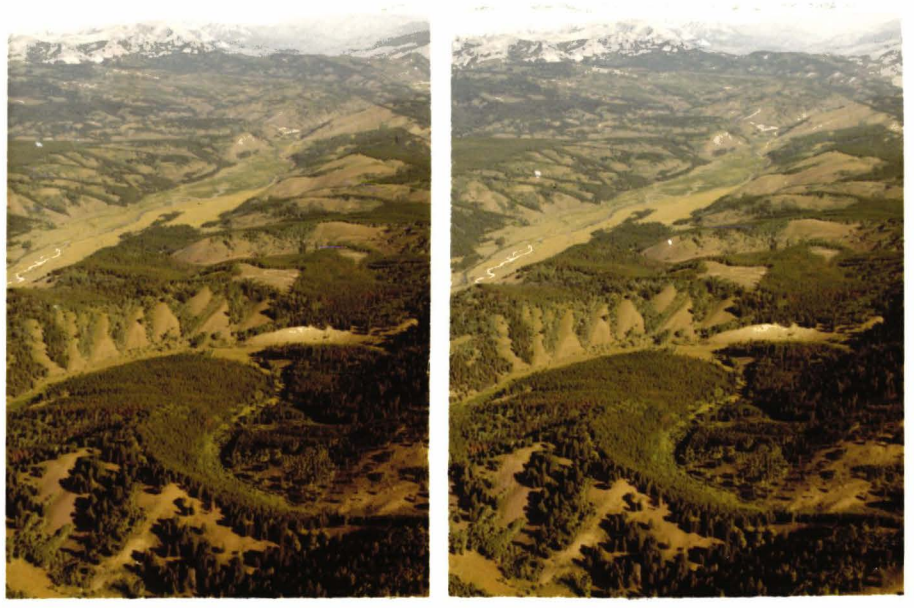
Easily the most extensive and damaging infestation in the Region today is on the Targhee Forest. On the Rexburg District in the southern end, the once huge infestation has subsided but not without serious depletion of lodgepole pine. To the north, along the west slope of the Grand Teton Range, where

[1] Formerly spruce budworm

control was undertaken for several years then stopped, beetle populations and subsequent tree killing have reached a peak level and will start to decline due to natural factors, chiefly host depletion. Logging is being continued in some areas to salvage as much dead, dying, and threatened timber as possible.

Farther north, north of the Cave Falls highway and west of Yellowstone Park, a different situation exists. Control was started in this general area in 1967 when the infestation was starting to increase but had not reached the high attack density occurring to the South. Persistent treatment the past two insect generations has not only held the infestation in check but caused a decrease in tree killing in some units. Justification for this intensive protection is the recent sale of 150 MM board feet of threatened lodgepole pine which, according to certain provisions of the timber sale contract, must be logged at a rate of 25 MM board feet per year, starting in March 1971. If the infestation can be held at approximately the same attack level (1.5 trees per acre) for the next three years, control will probably then be terminated. Once control is stopped, the infestation will run its course and normal tree killing will ensue. Control strategy at this time is to hold the infestation in check only to the extent necessary to insure the required volume. Immediate plans are to treat one large block of 200,000 trees on 130,000 acres before beetle emergence in 1970.

To the immediate east of the control area in Yellowstone Park, the infestation continues to increase. In the extreme southwest corner of the Park, in one mile-square area, there are 28 trees per acre currently infested. These populations, along with those south of the Cave Falls highway, exert tremendous pressure on the contiguous control area and will continue to do so for the next two to three years. The only other location showing increased tree killing is in scattered infestation centers on the Swan Valley District in the extreme south. Elsewhere on the Targhee Forest, tree killing is static or decreasing.



Stereograph showing buildup of mountain pine beetle in lodgepole pine in upper reaches of Greys River, Bridger Forest. Park Creek in foreground. Strategically placed clearcuts, as shown in the center of the picture, will affect long-term control of the beetle by converting these vulnerable stands to a less susceptible state.

In Grand Teton Park and Teton Forest, on the opposite side of the Grand Teton Range, contrasting conditions also exist. In the Park where control efforts were terminated in 1967, a general resurgence in tree killing is now in progress. Although treatment suppressed the outbreak temporarily, it did not stop it. Evaluation surveys show increased activity throughout most of the Park, except in stands in the Two Ocean-Emma Matilda Lakes area which have already been seriously depleted by the beetle. In most all other areas of the Park, particularly around Signal Mountain there is sufficient host material available to maintain a high level of tree killing for the next two, possibly three, years.

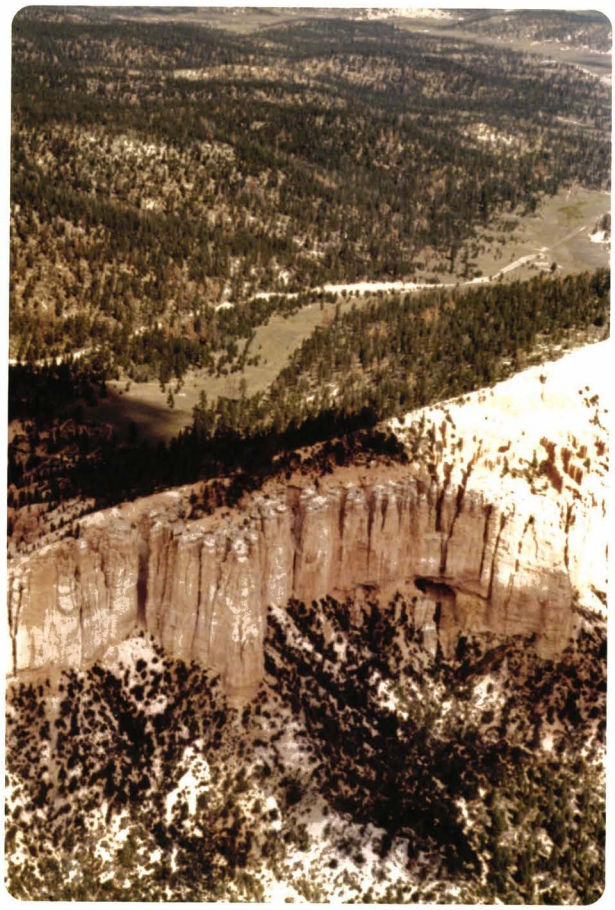
In neighboring Teton Forest the biological situation is considerably more optimistic. Tree killing in the Wilderness and in adjacent areas is at its lowest level in ten years. Widely scattered mortality of reduced intensity is still occurring in the upper reaches of the Wilderness, in Ditch Creek, and

around Antelope Mountain, near Slide Lake, and in several areas of the Hoback River Drainage on the southern end of the Forest. The large outbreak on Bureau of Land Management land around Signal Hill and Kismet Peak in the Upper Hoback has completely subsided but not without serious losses of merchantable size lodgepole pine.

Extreme conditions persist over a large area adjacent to the Bridger Wilderness on the Bridger Forest. The infestation is now so well established that the only feasible control alternative left is to log in and ahead of the infestation to salvage or save as much of the threatened timber as possible. However, because much of the timber surrounds a heavily-used recreation complex and borders the Wilderness, cutting activities have been delayed pending the completion and review of a recreation composite plan and further evaluation of all resources. In any event, if many of the areas under consideration are not logged within the next two years, most of the commercial timber will be lost. In the Wyoming Division, tree killing decreased in the lower part of the Greys River but increased in the upper reaches of the Little Greys River. In the Greys River, timber sales were strategically placed in and ahead of the infestation. This timely and farsighted cutting program will not only result in long-term control by converting infested and ultimately threatened stands to a less susceptible state, but will salvage portions of stands that would otherwise be lost.

Relatively isolated but damaging outbreaks persist in certain locales of the Boise, Sawtooth, Payette, Challis, and Caribou National Forests in Idaho and in the Cache National Forest in Idaho and Utah. On the Wasatch Forest in Utah, a possible epidemic may be in the offing in the upper reaches of the Bear River. Preventive spraying of lodgepole pine in several recreation sites on the Fairfield District, Sawtooth Forest, saved many trees that otherwise might have been killed.

Ponderosa Pine



Aerial view of ponderosa pine killed by the mountain pine beetle in Bryce Canyon National Park.

In Utah, most of the ponderosa pine mortality is in or near high-use recreation areas. Many large groups of fading trees are visible from the highway in Bryce Canyon Park. This infestation extends to the west into the East Fork of the Sevier River on the adjoining Dixie National Forest. An October survey showed an attack density of approximately one-half tree per acre, which approximated the 1968 infestation level. No control is planned.

In Flaming Gorge National Recreation area, broods have infested lodgepole as well as ponderosa pine. These mixed host populations are difficult to evaluate, but fall attack ratios portend a static to decreasing trend. Some treatment of infested trees within these high-use areas has been done in an attempt to minimize local buildups. Infested trees occur in scattered small groups. Since losses of this type are inevitable in an overmature stand, no control is recommended.

The persistent infestation on state and private lands southeast of Cascade, Idaho, that began on a modest scale in 1964, continues unabated. A survey showed that more than 11,000 trees were attacked and killed in 1968. Biological evaluations indicate that similar losses occurred in 1969. No control is planned.

Jeffrey pine

Small spot infestations of undetermined potential were observed in Dog Valley on the Carson District, Toiyabe Forest, California, and on private land west of Lake Tahoe, Nevada. In the latter infestation, which is adjacent to the Glenbrook Golf Course, infested trees will be felled and removed by the Nevada Division of Forestry.

Douglas-fir beetle, *Dendroctonus pseudotsugae* **Hopk.**

The Douglas-fir stands of the Intermountain Region periodically experience damaging cycles of the Douglas-fir beetle. The last infestation, Region-wide in extent, lasted over a decade and subsided in the early 1960's. The present infestation was triggered by winter storm damage in 1964-65 and continues to this day. Although not as extensive as the last outbreak, it is causing severe damage throughout southern Idaho. Heaviest tree killing is occurring on the Boise Forest with less spectacular but nonetheless serious damage occurring on the Payette, Sawtooth, Salmon, and Challis Forests.

The extent and severity of tree killing, the characteristic variable attack pattern of the beetle, and the inaccessibility of most of the infested material, makes control impossible at this time. Stepped-up logging as a salvage measure, and removing infested trees in and near existing sale areas to reduce tree killing locally, is recommended.

On the Boise Forest and possibly elsewhere in southern Idaho, this already serious outbreak may be further intensified by above normal windfall and snowbreak that occurred this winter and spring. Winter storms in 1968-69 deposited Douglas-fir debris over a wide area on the Ashton District, Targhee Forest. There were no large concentrations of material so extensive salvage was not practical. Most of the new beetle attacks were in the larger material next to clearcut areas containing brood- producing slash. It is logical that these areas will support the majority of standing tree attacks in 1970.

Because of the extreme seriousness of the present situation on the Boise and other Forests and the lack of effective control measures, any and all efforts suggesting potential control opportunities will be investigated. One promising method is the use of a synthetic sex attractant, frontalin, developed by the Boyce-Thompson Institute. In a very limited field trial, Douglas-fir bolts baited with frontalin and a host terpene successfully attracted beetle populations.

This finding set the stage for a much expanded field test to be conducted on the Boise Forest in 1970. In the spring, prior to beetle flight, several hundred baited and unbaited trees will be systematically located in the heart of the infestation to compare their relative attractiveness to in-flight Douglas-fir beetle populations. On completion of the study, all infested trees will be removed in a routine logging operation. The test will be conducted by Region personnel in cooperation with Boyce-Thompson Institute and the Intermountain Forest and Range Experiment Station.

Western pine beetle, *Dendroctonus brevicomis* **Lec.**

Killing of ponderosa pine by this insect remains at a relatively low level. Several small groups of fading pine were detected in portions of the Weiser River, Payette Forest. On the Dixie Forest, Utah, aggressive broods have resisted repeated control attempts in both young and mature stands in Browse Creek and Pine Valley recreation sites. Minor activity of a secondary nature occurred in which western pine beetle broods were associated with the mountain pine beetle in Bryce Canyon Park and with ips populations on the Boise Forest.

Roundheaded pine beetle, *Dendroctonus adjunctus* **Blandford**

Since 1966, this beetle has caused widely scattered tree killing of ponderosa pine in the Spring Valley Mountains—only an hour's drive from downtown Las Vegas, Nevada. Of major concern is the tree mortality occurring in the private summer home area in Kyle Canyon and in other recreation sites in Kyle and Lee Canyons. Control by falling the trees and spraying them with chemicals or removing them may have reduced tree killing locally, but has had little impact on the overall population level. Plans are to treat an additional 400 infested trees in 1970.

Heavy snow accumulations in winter of 1968-69 followed by a sequence of meteorological events in the spring triggered off huge avalanches which severed many trees and deposited large amounts of ponderosa pine and other debris in the canyon bottoms. The heaviest accumulations were in Kyle Canyon. Prompt removal of the larger material precluded any possible insect buildup.

Engelmann spruce bettle, *Dendroctonus obesus* **Mann.**

Region-wide spruce bettle activity in standing trees, which reached a relatively high level in 1968,

showed a significant decline in 1969. Most of the infestations were at high elevations and in steep roadless areas in southeastern Idaho and western Wyoming. A few infestations persist, however, the largest being in Owl and Berry Creeks in Grand Teton Park. Widely scattered tree killing of light intensity continues in portions of the Uinta National Forest, Utah.

Storm damaged spruce were successfully attacked by spruce beetles adjacent to several old sale areas near Upper Payette Lake, Payette Forest. Since the area contains numerous roads, salvage logging is recommended. A potentially serious situation was averted in Coyote Hollow on the Aquarius Plateau, Dixie Forest, Utah, by the removal of some 3 MM board feet of infested and susceptible logs. Nearby, one area of windthrown spruce, although not yet infested, has been sold but not yet logged. Burning infested slash and windthrown trees adjacent to a sale area in North Horse Creek, Bridger Forest, before beetle flight in spring of 1970, will reduce the threat to nearby green timber. Avalanche uprooted and broken spruce portends a serious situation in Granite Creek, Teton Forest. Although the debris was not infested in 1969, it will probably be attacked in 1970.

The large infestation on Hilgard Mountain, Fishlake Forest, continues. In some areas, most of the larger spruce has already been killed. Steep, rocky terrain over much of the area precludes salvage or logging for control. On the eastern edge of the infestation, which is operable, almost 400 M board feet has been sold sold and will be logged in 1970. Approximately one-third of this timber has been killed by the beetle.

Pine engraver, *Ips pini* (Say)

The climatological and physical factors that were believed responsible for inducing widespread killing of second-growth ponderosa pine by the pine engraver in parts of southern Idaho in 1967 were not evident during the past two years. Relatively moist summers and timely cutting and thinning practices have reduced tree killing in most areas to a low level. Storm damaged ponderosa pine precipitated a localized outbreak on the Boise Experimental Forest. Widely scattered group killing occurred near existing sale areas on the west edge of the Payette Forest. In the Ransack thinning area, Salmon Forest, winter and spring slash was attacked but the emerging broods were unable to overcome standing trees.

CONTROL CONSIDERATIONS, MOUNTAIN PINE BEETLE IN LODGEPOLE PINE

Experience gained and data collected by Research and Pest Control personnel during the past four to five years have added immeasurably to our knowledge of certain aspects of the population dynamics of the mountain pine beetle, its impact on stand structure, and its innate capacity to resist artificial control attempts. Briefly, the following points concerning the mountain pine beetle are becoming increasingly evident, at least in the Intermountain Region.

1. The mountain pine beetle does not decimate lodgepole pine stands to the extent earlier believed. The degree of destruction varies with habitat type and elevation. [1] Generally the fringe type stands at lower elevations bordering sagebrush flats suffer the worst damage. In extreme cases, 50 percent of lodgepole pine larger than 5.0 inches d.b.h. has been killed. In interior stands at intermediate elevations, as in the Teton Wilderness, less than 30 percent of the stand was killed. In all cases, the larger trees are killed first and they are killed in an amount disproportionate to their occurrence in the stand, with the final effect of rendering most stands commercially inoperable, at least for the immediate future.

2. Control effects of individual tree treatment of large infestations in physiologically mature and overmature lodgepole pine stands, as earlier suspected, are relatively short lived. [2] Recent studies [3] have shown that, following an outbreak, stand structure in treated stands is essentially the same as in untreated stands—the only difference being that treatment extends the infestation over a longer period of time.

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1 Roe, Arthur L. and Gene D. Amman, 1970. The Mountain Pine Beetle in Lodgepole Pine Forests, U.S.D.A. Forest Service Research Paper. In press.

2 Klein, William H. and Mark D. McGregor, 1966. Forest Insect Conditions in the Intermountain States during 1965. Processed. 13 pp.

3 Amman, Gene D. and Bruce H. Baker, 1970. Mountain Pine Beetle Influence on Lodgepole Pine Stand Structure: An Analysis of Treated and Untreated stands. In press.

3. Since losses in susceptible stands will eventually be the same whether treated or not, the decision for or against control can be justified only on immediate benefits. If a holding action is needed to reduce tree killing in existing sale areas, or to slow the beetles' movement into proposed sale areas, and these areas are to be logged in a specified period of time, say two or three years, and projected benefits of this delay action more than offset control costs, then treatment may be justified. On the other hand, if control is undertaken with no other purpose than just to save trees, then any temporary advantage will be offset by inevitable losses.

DEFOLIATORS

Western budworm, *Choristoneura occidentalis* Freeman

Even though the western budworm continues to be a potential threat to the Douglas-fir-true fir forests of the Intermountain Region, it has continued to remain at a tolerable level. From an all-time high in 1964, the year of the last DDT control project, the amount of infested acreage dropped significantly in 1965, continued to decrease for the next two years, increased slightly in 1968, and maintained this level in 1969. Following is a breakdown of infested area by defoliation levels, as determined by aerial surveys, during the past decade:

Defoliation Intensity

Year	Light (Acres)	Moderate (Acres)	Heavy (Acres)	Total (Acres)
1960	297,000	80,000	19,000	396,000
1961	643,000	229,000	553,000	1,425,000
1962	480,000	373,000	788,000	1,641,000
1963	357,800	276,600	988,800	1,623,200
1964	266,000	658,000	1,352,000	2,276,000
1965	465,600	254,500	795,200	1,515,300
1966	923,900	52,200	16,100	992,200
1967	162,200	54,900	1,600	218,700
1968	333,500	150,200	21,800	505,500
1969	388,800	125,400	30,200	544,400

This relatively low level of budworm activity was not expected to continue. An analysis of 1968 egg mass data indicated potential increases in most infestations in 1969; however, this resurgence did not materialize. The reasons for this setback of budworm populations are unknown.

The only areas supporting increased budworm activity were the Payette Forest, and to a much lesser extent, the Boise Forest. In all other areas, both the extent and intensity of defoliation declined. For the first time in over a decade, no defoliation was visible from the air on the Sawtooth Forest. The most significant setback was on the Bridger, Teton, Targhee, and Caribou Forests where increased activity was predicted. Not only did the size of the infestation diminish but no heavy defoliation was detected from the air. Followup ground examinations confirmed this light activity. Very light budworm populations on white fir, *Abies concolor*, were detected on the ground for the first time in Bryce Canyon Park, Utah. A tabulation of budworm activity on each Forest during 1969 follows. The distribution of this and other major insect infestations are shown on the appended map.

Defoliation Intensity

Forest	Light (Acres)	Moderate (Acres)	Heavy (Acres)	Total (Acres)
Ashley	400	----------	---------	400
Boise	21,500	8,000	1,500	31,000
Bridger	69,800	3,000	---------	72,800
Caribou	300	200	---------	500
Challis	20,000	----------	---------	20,000
Payette	219,300	114,200	28,700	362,200
Salmon	47,700	----------	---------	47,700
Targhee	1,800	----------	---------	1,800
Teton	8,000	----------	---------	8,000
	388,800	125,400	30,200	544,400

No significant deviation from the present status of budworm activity is expected in 1970. Egg mass data indicate that heavy feeding will occur in portions of the Payette Forest while light to moderate defoliation will continue in all other areas. Neither is any significant change expected in present infestation boundaries. No control is planned.

Sugar pine tortrix, *Choristoneura lambertiana* **(Busck)**

Repeated defoliation of this lodgepole pine by the sugar pine tortrix resulted in top kill and multiple branching. Teton National Forest.

Damage by this insect is considerably less spectacular than most other defoliators for its feeds exclusively on new growth of lodgepole pine. The Bishop Mountain infestation on the Targhee Forest has subsided, at least for the present, but to the south on the Porcupine District, more than 10,000 acres were lightly to moderately defoliated. Noticeable activity has occurred in this area for five consecutive years. On the opposite side of the divide, in Grand Teton Park and Teton Forest, less extensive infestations persist. In one area in Fall Creek on the Forest, light defoliation of pole-size lodgepole continues. In nearby Mosquito Creek, where heavy defoliation was observed in 1968, no insects, their damage or remains could be found in 1969.

In Grand Teton Park between Jenny Lake and Spaulding Bay, feeding damage was more obvious. During recent years, tortrix populations in this area have varied less than those on the Forest. This consistent feeding activity has eventually resulted in top kill and deformation of many intermediate and codominant lodgepole pine. However, the damage is neither extensive nor severe enough to warrant control measures.

Tent caterpillars, *Malacosoma* **spp.**

Widely scattered defoliation of range plants, principally bitterbrush, by a tent caterpillar, *Malacosoma* sp., continued in certain areas of Utah but at a considerably reduced level. Most of the active infestations are on the Monroe unit of the Fishlake Forest. The heavy populations that caused repeated defoliation of bitterbrush on Bell Rock Ridge and in Davis Hollow were

reduced to an endemic state by natural factors. The plants experienced some twig kill and possibly some growth loss but no mortality was observed. In another area in the southwest portion of the unit, a rather extensive but light infestation was detected. This area will be closely watched in 1970.

The enduring infestation of another tent builder, *Malacosoma incurvum discoloratum* on Fremont cottonwood in Zion National Park [1] and along the Virgin River may finally be coming to a close. The infestation reached a peak in 1965 and with the exception of a few areas, has been on the decline since. A local infestation of moderate intensity has persisted in a few areas in Zion Park and because of their proximity to campsites, they were sprayed by mistblower with a commercial preparation of *Bacillus thuringiensis*.

Declining larval populations were also noted in unsprayed areas. A scarcity of egg masses indicates that even lower populations can be expected in 1970. Control is not recommended.

A blotch miner, possibly *Phyllonorycter* sp.

Concurrent with the decrease of the tent caterpillar on Fremont poplar in Zion Park was a sudden increase in blotch miner activity. Although this pest has caused varying degrees of damage for several years, defoliation was exceptionally heavy in 1969.

Damage to the individual leaves takes the form of oval-shaped mines. Those leaves containing several mines turn brown and fall prematurely. In some areas of the Park, the ground beneath heavily infested trees was completely covered with leaf debris. The lower part of the tree crown appears to suffer the worst damage.

Because so little is known of the biology of this pest, trend predictions are difficult to make. Pupal parasites were present in the vacated mines and in the duff but whether they are numerous enough to offset an apparent increased trend is unknown. Investigations to locate the preferred oviposition site will be initiated in the spring of 1970.

A looper, *Lambdina punctata* (Hulst)

First reported in 1967, this looper has extended its range along the Wasatch Front in Utah. Gambel oak, the preferred host, was defoliated in widely separated outbreaks from American Fork south to Levan. Heavy defoliation occurred in portions of Battle Creek, Pole Canyon, Dry Mountain and in the Wash Canyon area. In the Dry Mountain area, defoliation was estimated to be in the neighborhood of 85 to 100 percent. Gambel oak is a hardy species and will refoliate even following complete defoliation. However, the real danger is the increased fire hazard in areas of heavy defoliation. Leaf residue on the ground increases the fuel supply and the sparse canopy results in higher ground temperatures.

If spring evaluation surveys indicate increased activity during 1970, emergency control measures will be considered. Efforts to learn more of the biology of this geometrid are in progress and will continue until the infestation subsides.

A tussock moth, *Orgyia vetusta gulosa* (Hy. Edw.)

The only known location of this insect in the intermountain area is in the Town Creek Plantation, Boise Forest. This defoliator characteristically feeds on ceanothus and other bushes, but in years when populations are high and competition for available food increases, the larvae will migrate to nearby ponderosa pines. In 1968, some egg deposition occurred on the pines and it was not known whether the newly hatched larvae would commence feeding on the pines or migrate back to ceanothus. Although populations were relatively light, firsthand observations indicated that migration from the pines did, in fact, occur. Later, the already light larval populations were further reduced by a polyhedrosis virus. Very little defoliation to the broadleaf bushes or ponderosa pine resulted. The status of the tussock moth is unknown.

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[1] Baker, B. H. 1970. Occurrence of *Malacosoma incurvum discoloratum* in Zion Canyon, Utah, (Lepidoptera: Lasiocampidae). Pan-Pacific Entomologist 46:27-33.

White fir needle miner, *Epinotia meritana* Hein.

The infestation in white fir in portions of Bryce Canyon and Dixie Forest increased slightly over that recorded in 1968. Aerial observers mapped additional defoliation in portions of Cougar Hollow on the Park and Forest and in Coyote Hollow, Podunk Creek, and Robinson Canyon on the Forest. Early summer evaluations recorded only light population levels. No unusual increase is expected in 1970.

A white fir defoliator, *Argyrotaenia dorsalana* (Dyar)

This insect was detected in 1968 on developing growth of white fir in approximately the same area as the white fir needle miner. Larval populations increased over those in 1968, but they were still not heavy enough to incur significant damage. No biological information is available on this insect; consequently, its damage potential is unknown.

OTHER INSECTS

Lodgepole pine terminal weevil, *Pissodes terminalis* Hopp.

In one natural reproduction area in Sawtooth Valley, Sawtooth Forest, weeviling of lodgepole pine increased significantly in 1969. In this location, three areas, each containing one hundred trees, were established in 1967 to determine the long-range impact on lodgepole pine. Over 80 percent of the trees in each area have been weeviled at least once. In 1969, trees in each of the three areas were weeviled 35, 39, and 69 percent, respectively. Damage was to leaders or laterals that expressed dominance. At present, tree form is affected but whether the tree will eventually outgrow the deformity by the time it reaches merchantable height is unknown.

Less serious weeviling of lodgepole pine was detected in other reproduction areas on the Challis and Targhee Forests, Idaho, and the Bridger Forest, Wyoming.

Grass plant bug, *Labops hesperius* Uhler

In 1968, 5,000 acres of planted grassland in the East Fork of the Sevier River, Dixie Forest, were aerially sprayed to control *Labops* populations. Technical grade (95 percent) malathion was applied at a rate of 8 ounces per acre. Followup surveys in the spring of 1969 found only light grass plant bug activity in most of the sprayed areas indicating that some control was achieved. According to Forest personnel, *Labops* prefers intermediate and pubsecent wheat to crested wheat. Even though the insects do not kill the grass, heavy populations damage them to the extent that spring forage in reseeded areas is adversely affected.

Other forest and range pests

Fall webworm, *Hyphantria cunea* (Drury) populations were particularly heavy on narrow leaf cottonwood along portions of the Sevier River in southern Utah. Persistant infestations of a spruce mealybug, *Puto sandini* Washburn, on Engelmann spruce continue in two locations in Utah. Pinyon pine cones collected near Panguitch, Utah, were lightly damaged by a seedworm, possibly *Eucosma* sp. A localized but serious infestation of the pine needle scale, *Phenacaspis pinifoliae* (Fitch), in lodgepole and Jeffrey pine in South Lake Tahoe, California, has reportedly extended its range into Nevada. Defoliation of pinyon pine by the pinyon needle scale, *Matsucoccus acalyptus* Herb., continues at a reduced level in some areas in southern Utah. Forest personnel reported a serious infestation of this scale on the West Walker District of the Toiyabe Forest. A heavy infestation of another scale, *Toumeyella* sp., was found on an ornamental Douglas-fir in Ogden, Utah. Heavy populations of *Archips negundanus* (Dyar) caused varying degrees of damage to box elder in northern Utah. A shoot miner, possibly *Dioryctria gullosella* (Hulst), was found lightly infesting sapling and pole-size lodgepole pine over a wide area on the Targhee Forest, Idaho.

FOREST DISEASES

Dwarf mistletoe

Dwarf mistletoe herbicide control administrative study plots were established in Jeffrey pine on the Toiyabe Forest, in ponderosa pine on the Dixie Forest, and in lodgepole pine and Douglas-fir on the

Sawtooth Forest during 1969. Results of these tests will not be available until after the growing season begins. However, the results of last year's tests are cause for reasonable optimism. An interim report on progress made to date on the Dwarf Mistletoe Herbicide Control Administrative Study will be finished shortly. A show-me trip is planned for the fall of 1970 to which all interested and concerned personnel will be invited.

A cooperative dwarf mistletoe control project was completed on Idaho State Lands near Horseshoe Bend in 1969.

This year ten project proposals for dwarf mistletoe control were submitted by various forests. One was cancelled due to the fact that the forest had no seedlings in the nursery with which to reforest the area on which they planned control operation. Should the remaining projects be funded and accomplished, then at least 1,150 acres of dwarf mistletoe control will be done in 1970.

Root rots

Fomes annosus

A number of aerial detection flights resulted in apparent *Fomes annosus* root rot infection centers being ground checked. Extensive mortality by *annosus* to subalpine fir was found on the north slope of Mount Nebo, Uinta Forest, in an old ski area. The infection courts were apparently a number of ax cut stumps created during a thinning operation. Other infection centers were found on Willow Creek and Bartholomew Canyon, also on the Uinta. Both of those centers are in subalpine fir on high ridges where no logging or cutting of any kind has occurred. However, these ridges are subject to high winds, snow avalanches, and general ice and snow damage. In both cases evidence of tree uprooting and root breakage was obvious. On the Beaver Mountain Ski Area, Cache Forest, a new *F. annosus* center was found. The infection court was most likely created during road building or trail clearing when the area was first established. Another center was found near Ricks Spring in Logan Canyon on the Cache Forest. On the Toiyabe Forest, a number of *F. annosus* infection centers in white fir were found associated with old ax cut stumps in the Dog Valley area.

Last fall a *Fomes annosus* Control Administrative Study was established in Dog Valley in cooperation with the Pacific Southwest Forest and Range Experiment Station. Treatments tested were "Borax," sodium nitrite and high stumping. Another replication of the same plot will be established in May or June.

Verticicladiella wagenerii

At the request of the Superintendent of the Dinosaur National Monument, extensive dying of pinyon pine was investigated. The cause of the mortality was found to be due to the action of a staining fungus, *Verticicladiella wagenerii.* This is an unusual type of pathogen in that it stains the wood of the roots a purplish-brown while at the same time the tree gradually dies. There is no typical pattern to the stain such as is usually visible with typical blue stains, i.e., wedge-shaped. The infection mechanism is not known nor is there any control for this problem.

White pine blister rust

Random checks for white pine blister were made in the Ketchum area of the Sawtooth Forest. No infection was found. A weeklong pack trip was made in the southern end of the Bridger Wilderness Area with constant checks being made for infection and again none was found. This coming season the blister rust check will begin at a known infection area at the upper end of Fremont Lake.

Other problems

Air pollution

Interest and requests for assistance in this field are increasing. A field trip in May is planned to attempt to assess toxic gas damage around a copper smelter in Nevada. A request was made by the Park Service to conduct an evaluation survey on present condition of the vegetation immediately

by Lake Powell and on adjacent lands. A thermal electric generating plant is to be constructed near Page, Arizona, which will burn 25,000 tons of coal a day. Park Service personnel are concerned about the effect the toxic gases will have on the Lake Powell National Recreation Area.

An evaluation was made last May to assess the damage done to and the degree of recovery of vegetation in Georgetown Canyon, Caribou Forest, caused by fluorine gas emitted by the Central Farmers Supply phosphate reduction plant. With the closing of the plant in 1965, release of the fluorine gas also ceased. Grasses, forbs, and herbaceous plants are now growing vigorously. However, Douglas-fir reproduction on the areas in which most of the fir has been killed is lacking. Requests for assistance in evaluating air pollution caused problems should be sent to the Regional Pathologist.

Problems in recreation areas

Interest in disease problems on recreation areas is increasing. Efforts are to anticipate and prevent problems before they occur. The best way to do this is by examining prospective recreation sites as early as possible before any construction begins. Recreation oriented insect and disease training sessions will be held to alert personnel to the dangers of and train them in the recognition of hazardous trees. Stand manipulation through cultural operations which may make the cover less susceptible to attack by various destructive agents and whatever other treatment we feel is necessary to provide a safe, healthy stand of trees for the site are some of the methods recommended. If the removal of an overmature stand on a prospective recreation site is indicated, it will be recommended. By conducting such cultural operations years before actual construction begins, much of the logging damage will have healed.

In 1970, training sessions designed specifically for Landscape Architects and Recreation Staff personnel will be conducted. These sessions are to train people in recognition of hazardous situations that presently exist on lands within their areas of responsibility. It is hoped that this training will help them in choosing future recreation sites which will present fewer hazards or enable them to recognize potential hazards.

Recent court decisions on tree failure cases are of interest to all personnel involved in recreation sites with tree cover. A severely rotted willow fell and seriously injured two persons who had rented a home and the land upon which the willow was growing. The injured parties sued the owners for medical expenses. The jury's decision was that the owners were not liable since the average layman is not expected to recognize when a tree is a hazardous condition due to heart or root rot or general low vigor. However, a recent decision concerning a tree failure in Yellowstone Park in which a lodgepole pine broke and fell upon a camper, killing him, resulted in a judgment against the Government because:

1. The camper was an invitee.

2. Park Service Rangers are supposed to be tree experts and as such must be able to recognize a hazardous tree condition. The implications are obvious. All personnel, therefore, should remain constantly alert to hazards on recreation sites in order to protect the public and the Government.

AFLC/HAFB, Ogden

DISTRIBUTION OF MAJOR FOREST INSECT INFESTATIONS IN REGION 4

1969

LEGEND

Mountain Pine Beetle

Douglas-fir Beetle

Spruce Budworm

Based on aerial and ground surveys

DIVISION OF TIMBER MANAGEMENT

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

SCALE *miles* 0 40

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